

REMARKS

In the Office Action mailed June 21, 2007 the Examiner noted that claims 1-20 were pending; objected to claims 4, 5 and 7-14; and rejected claims 1-20. Claims 4, 5 and 7-9 have been amended to form independent claims; claims 6, 17 and 20 have been canceled and, thus, claims 1-5, 7-16, 18 and 19 remain pending for reconsideration which is requested.

On page 35 of the specification, the paragraph beginning at line 3 has been amended to correct a minor typographical error that would have been apparent to one of ordinary skill in the art. No new matter has been added.

The Examiner's rejections and objections are traversed below.

Claim Objections

The Examiner objected to claims 4, 5, and 7-14 as being dependent upon a rejected base claim. Claims 4, 5 and 7-9 have been rewritten into independent form as suggested by the Examiner, and, therefore, claims 4, 5 and 7-9, as well as claims 10-14 which depend therefrom, should be in condition for allowance.

35 U.S.C. §103(a) Rejections

In item 6 on pages 2-4 of the Office Action, claims 1, 3, 15, 16, 18 and 19 were rejected under 35 U.S.C. 103(a) as being unpatentable over JP 00137788 (Kaneshiro), further in view of JP 06243367A (Kaneko).

Regarding the rejection as to independent claims 1, 15, and 18 the Office Action asserted that Kaneshiro discloses, "[i]ntegral values of edge intensity in the top-bottom direction of the image are found, block, by block, wherein blocks correspond to pixels" (Office Action, page 3, lines 7-9).

However, independent claim 1 recites, "a vertical adding section for adding the respective pixel data in the vertical direction of the image data" (claim 1, lines 12-13) which is supported by the embodiment of the invention described at page 22, lines 18-25 of the application. Kaneshiro neither teaches nor suggests adding pixel data in a vertical direction. Rather, Kaneshiro is directed to an image processing method in which edge intensity is calculated in a vertical direction after dividing picked-up images into blocks. Moreover, Kaneshiro multiplies edge intensity in a vertical direction in each small block, wherein the multiplied value is a feature quantity. This enables the feature amount obtained to be used for

pattern matching to determine a face area. As a result of the differences in operation, it is respectfully submitted that Kaneshiro does not disclose the limitation quoted above from claim 1.

Furthermore, the Office Action alleged that Kaneko discloses "monitor[ing] the direction of the face or the sight of the vehicle driver 1" (Office Action, page 3, Lines 18 and 19). However, independent claim 1 recites "detecting a face orientation based on a plurality of sum values calculated by said vertical adding section" (claim 1, lines 14-15) which is supported by the embodiment of the invention described at page 3, lines 10-16 of the application. By calculating the sum values in the vertical adding section, an orientation detection section may detect the orientation of the face. As a result, the amount of data to be processed is reduced, thereby, providing the benefit of requiring less processing time to detect the orientation of the face.

It is submitted that Kaneko neither teaches nor suggests detecting a face orientation. Rather, Kaneko is directed to an inattentive driving decision device. According to Applicants, Kaneko describes that the face direction is determined by use of two inner corners of both eyes and both ends of lips. Therefore, Kaneko refers to detecting the direction of a driver's face.

For all of the reasons set forth above, it is respectfully submitted that claim 1 patentably distinguishes over Kaneshiro in view of Kaneko.

Independent claim 15 recites "adding the respective pixel data in the vertical direction of the image data" (claim 15, line 4) and claim 18 recites "add[ing] the respective pixel data in the vertical direction of the image data" (claim 18, lines 6-7). In addition, claim 15 recites "detecting a face orientation based on a plurality of sum values calculated" (claim 15, last line) and claim 18 recites "causing the computer to detect a face orientation based on a plurality of sum values calculated" (claim 18, last 2 lines). Therefore, it is respectfully submitted that claims 15 and 18 patentably distinguish over Kaneshiro in view of Kaneko for reasons similar to those discussed above with respect to claim 1.

Regarding the rejection of independent claims 3, 16 and 19, the Office Action asserted that Kaneshiro and Kaneko disclose that it "would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the teachings of Kaneshiro and Kaneko directed to a left-to-right, right-to-left, or horizontal direction for human face extraction and orientation" (Office Action, page 4, lines 7-9).

However, independent claim 3 recites, "an eye detecting section for detecting an eye position in the vertical direction based on a plurality of sum values calculated by said horizontal adding section" (claim 3, lines 28-29) which is supported by the embodiment of the invention described at pages 25, line 7 to page 28, line 13 of the application. By adding pixel data aligned

next to each other in the horizontal direction of the image frame and sequentially adding the pixel data aligned in the horizontal direction of the image frame, the y-coordinate of an eye position is determined. As a result, a face direction is detected based on a pattern of projections in a vertical direction around the determined y-coordinate.

Kaneko neither teaches nor suggests the aforementioned features of claim 3. As discussed above, Applicants submit that Kaneko detects a face direction based on four points. For example, two points are located at two inner corners of both eyes and the other two points are located at both ends of lips, thereby, extracting characteristics points for a face. In addition, the face is symmetric to the center axis. Thus, the face direction is calculated by an isosceles trapezoid shaped by four points.

Moreover, Kaneshiro neither teaches nor suggests the aforementioned features of independent claim 3. Kaneshiro describes dividing an area of a face into small blocks. Then determine an eye portion and a cheek portion based on a luminance distribution.

For the reasons set forth above, it is respectfully submitted that independent claim 3 patentably distinguishes over Kaneshiro in view of Kaneko.

Independent claim 16 recites "detecting an eye position in the vertical direction based on a plurality of sum values calculated" (claim 16, lines 5-6) and claim 19 recites "causing the computer to detect an eye position in the vertical direction based on a plurality of sum values calculated" (claim 19, lines 8-9). Therefore, it is respectfully submitted that claims 16 and 19 patentably distinguish over Kaneshiro in view of Kaneko for reasons similar to those discussed above with respect to claim 3.

In item 7 on pages 4-6 of the Office Action, claims 6, 17 and 20 were rejected under 35 U.S.C. §103(a) as being unpatentable over Kaneshiro in view of Kaneko and further in view of U.S. Patent No. 6,611,613 (Kang et al.). Claims 6, 17, and 20 have been cancelled, and, therefore, this rejection is moot.

In item 8 on pages 6-7 of the Office Action, claim 2 was rejected under 35 U.S.C. §103(a) as being unpatentable over Kaneshiro in view of Kaneko and further in view of JP 06333023 (Murata). First, it is submitted that Murata does not teach or suggest modification of Kaneshiro and Kaneko to overcome the deficiencies discussed above with respect to claim 1 from which claim 2 depends. Therefore, it is submitted that claim 2 patentably distinguishes over Kaneshiro, Kaneko and Murata for at least the reasons discussed above with respect to claim 1.

Furthermore, the Office Action acknowledged that

Kaneshiro and Kaneko do not appear to disclose "a characteristic table storing the characteristic data in association with a plurality of face orientations, where said orientation detecting section selects, from said characteristic table, a face orientation corresponding to the characteristic data extracted by said extracting section, but Murata does in the constitution and Figs. 16(a)-(d)"

(Office Action, page 7, lines 5-9).

As indicated by the Examiner, claim 2 recites "a characteristic table storing the characteristic data in association with a plurality of face orientations" (claim 2, lines 20 and 21) which is supported by the embodiment of the invention described at pages 7, line 23 to page 8, line 14 of the application. As a result, memory capacity for storing data used in the face orientation judging process is reduced and the face direction can be detected accurately based on the photographed image.

Murata neither teaches nor suggests the limitations quoted above from claim 2. Murata is directed to an age presuming device to quickly and easily presume an age based on a produced face image. According to Applicants, Fig. 16 does not describe such a characteristic table as recited in claim 2. Therefore, Murata fails to teach or suggest determining the direction of a face based on a pattern of the projected values as described in claim 1 using a characteristic table as recited in claim 2. Thus, it is respectfully submitted that claim 2 patentably distinguishes over Kaneshiro, Kaneko and Murata.

Summary

In accordance with the foregoing, it is respectfully submitted that all outstanding objections and rejections have been overcome and/or rendered moot. Further, all pending claims patentably distinguish over the cited art. There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

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If any further fees, other than and except for the issue fee, are necessary with respect to this paper, the U.S.P.T.O. is requested to obtain the same from deposit account number 19-3935.

Respectfully submitted,

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